



2021 2nd International Symposium on Automation, Information and Computing (ISAIC 2021)

Conference Program

(China Standard Time / Beijing Time, GMT +08:00)

December 3-6, 2021 Online

www.isaic-conf.com



TABLE OF CONTENTS

Join a Meeting & Test.....	2
Part I Conference Schedule.....	3
Part II Plenary Speeches	5
Plenary Speech 1: Georgia Tech’s Online Master of Science in Computer Science and the Future of Online Learning	5
Plenary Speech 2: Adaptive and Learning Model Predictive Control for Uncertain Dynamic Systems	6
Plenary Speech 3: Transitioning into Connected and Autonomous Transportation Infrastructures	7
Plenary Speech 4: Dynamic Event-Triggered Distributed Coordination Control and Its Applications	8
Plenary Speech 5: 2D van der Waals Heterostructures for Emerging Device Applications	9
Plenary Speech 6: Towards General Optimization Intelligence	11
Plenary Speech 7: PID Control Meets Networked Systems: The State-Space Approach	12
Plenary Speech 8: Edge Intelligence - Engineering the New Fabric of IoT, Edge, and Cloud	13
Plenary Speech 9: Towards Solving the Hard Problem of Consciousness: The Varieties of Brain Resonances and the Conscious Experiences That They Support.....	14
Plenary Speech 10: How DEVS-based Modeling and Simulation Supports Design of Intelligent Cyber-physical Systems.....	16
Plenary Speech 11: Recent Advances on Hand Rehabilitation Robots for Post-Stroke Patients	17
Part III Poster Presentations.....	19
Part IV Oral Presentations	20
Oral Session_1 Artificial Intelligence (I)	20
Oral Session_2 System Modelling and Analysis (I)	21
Oral Session_3 Artificial Intelligence (II).....	22
Oral Session_4 System Modelling and Analysis (II)	24
Oral Session_5 Network Science and Engineering.....	25
Oral Session_6 Intelligent Control.....	26
Oral Session_7 System Optimization and Application (I)	28
Oral Session_8 System Optimization and Application (II).....	29
Oral Session_9 Smart Assistive Technology: A Special Session	29

Join a Meeting & Test

Download the application software: [VooV Meeting \(腾讯会议\)](#)

- Join the meeting by clicking the accessing link as indicated for each session.
- Join the meeting with the specific VooV Meeting ID indicated for each session:
 1. Click “Join Meeting”;
 2. Verify with your mobile number to enter the meeting room
(If there is a problem to verify with your mobile number, it is suggested to register a VooV Meeting account first and then join the meeting with the ID).

(Note: Please have your microphone switched off or turned to silent when the speaker is talking.)

Meeting for test:

Time: **December 2, 2021, Thursday**

09:00-12:00 & 19:00-22:00 (Beijing Time, GMT +08:00)

VooV Meeting Room: **Test Meeting for ISAIC 2021**

VooV Meeting ID: **354 182 085**

Accessing Link: <https://meeting.tencent.com/dm/VQnMTXuYl2xk>

Part I Conference Schedule

December 3, 2021, Friday

Time	Plenary Session (I)
	VooV Meeting ID: 232 856 234 Accessing Link: https://meeting.tencent.com/dm/Uaw40FrcgAMF
09:00-09:10	Welcome Speeches <i>Prof. Shiping Wen, University of Technology Sydney, Australia</i> <i>Prof. Guoguang Wen, Beijing Jiaotong University, China</i>
09:10-09:50	Plenary Speech 1 <i>Georgia Tech's Online Master of Science in Computer Science and the Future of Online Learning</i> <i>Prof. Zvi Galil, Georgia Institute of Technology, USA</i>
09:50-10:30	Plenary Speech 2 <i>Adaptive and Learning Model Predictive Control for Uncertain Dynamic Systems</i> <i>Prof. Yang Shi, University of Alberta, Canada</i>
10:30-11:10	Plenary Speech 3 <i>Transitioning into Connected and Autonomous Transportation Infrastructures</i> <i>Prof. Hossam A. Gabbar, Ontario Tech University, Canada</i>
11:10-11:50	Plenary Speech 4 <i>Dynamic Event-Triggered Distributed Coordination Control and Its Applications</i> <i>Prof. Qing-Long Han, Swinburne University of Technology, Australia</i>
BREAK TIME	
19:00-19:40	Plenary Speech 5 <i>2D van der Waals Heterostructures for Emerging Device Applications</i> <i>Prof. Feng Miao, Nanjing University, China</i>
19:40-20:20	Plenary Speech 6 <i>Towards General Optimization Intelligence</i> <i>Prof. Yew-Soon Ong, Nanyang Technological University, Singapore</i>
20:20-21:00	Plenary Speech 7 <i>PID Control Meets Networked Systems: The State-Space Approach</i> <i>Prof. Zidong Wang, Brunel University London, UK</i>
21:00-21:40	Plenary Speech 8 <i>Edge Intelligence - Engineering the New Fabric of IoT, Edge, and Cloud</i> <i>Prof. Schahram Dustdar, TU Wien, Austria</i>

December 4, 2021, Saturday

Time	Plenary Session (II)
	VooV Meeting ID: 751 443 642 Accessing Link: https://meeting.tencent.com/dm/6BVA8feTZioZ
09:00-09:40	Plenary Speech 9 <i>Towards Solving the Hard Problem of Consciousness: The Varieties of Brain Resonances and the Conscious Experiences That They Support</i> <i>Prof. Stephen Grossberg, Boston University, USA</i>
09:40-10:20	Plenary Speech 10 <i>How DEVS-based Modeling and Simulation Supports Design of Intelligent</i>

	<i>Cyber-physical Systems</i> Prof. Bernard P. Zeigler, University of Arizona, USA
10:20-11:00	Plenary Speech 11 <i>Recent Advances on Hand Rehabilitation Robots for Post-Stroke Patients</i> Prof. Long Cheng, Institute of Automation, Chinese Academy of Sciences, China
BREAK TIME	
Time	Oral Session
19:00-23:00	Oral Session 1: Artificial Intelligence (I) VooV Meeting ID: 214 309 960 Accessing Link: https://meeting.tencent.com/dm/NymjcHTaejPd
	Oral Session 2: System Modelling and Analysis (I) VooV Meeting ID: 574 460 370 Accessing Link: https://meeting.tencent.com/dm/yU0DLwvPNY3b

December 5, 2021, Sunday

Time	Schedule
09:00-12:30	Oral Session 3: Artificial Intelligence (II) VooV Meeting ID: 577 562 400 Accessing Link: https://meeting.tencent.com/dm/5LVTRbhWekpi
	Oral Session 4: System Modelling and Analysis (II) VooV Meeting ID: 664 197 898 Accessing Link: https://meeting.tencent.com/dm/P8M3srmFGkbq
BREAK TIME	
19:00-23:00	Oral Session 5: Network Science and Engineering VooV Meeting ID: 897 836 081 Accessing Link: https://meeting.tencent.com/dm/WgFpRfbUankC
	Oral Session 6: Intelligent Control VooV Meeting ID: 493 362 663 Accessing Link: https://meeting.tencent.com/dm/4rJVjXG7o5OT

December 6, 2021, Monday

Time	Schedule
09:00-12:00	Oral Session 7: System Optimization and Application (I) VooV Meeting ID: 336 344 067 Accessing Link: https://meeting.tencent.com/dm/jggzemo1ioLn
BREAK TIME	
19:00-22:00	Oral Session 8: System Optimization and Application (II) VooV Meeting ID: 967 789 317 Accessing Link: https://meeting.tencent.com/dm/QpzIGSJ4uHCY
	Oral Session 9: Smart Assistive Technology -- A Special Session VooV Meeting ID: 251 709 735 Accessing Link: https://meeting.tencent.com/dm/QpzIGSJ4uHCY

Part II Plenary Speeches

Plenary Speech 1: Georgia Tech's Online Master of Science in Computer Science and the Future of Online Learning



Speaker: Prof. Dr. Zvi Galil

Former John P. Imlay, Jr. Dean of Computing, Storey Chair, and Professor,
Georgia Institute of Technology, USA

Fellow of the ACM

Fellow of the American Academy of Arts and Sciences

Short Biography: Zvi Galil was born in Tel-Aviv, Israel. He earned BS and MS degrees in Applied Mathematics from Tel Aviv University, both summa cum laude. He then obtained a PhD in Computer Science from Cornell University. After a post-doctorate in IBM's Thomas J. Watson research center, he returned to Israel and joined the faculty of Tel-Aviv University. He served as the chair of the Computer Science department in 1979-1982.

In 1982 he joined the faculty of Columbia University. He served as the chair of the Computer Science Department in 1989-1994 and as dean of The Fu Foundation School of Engineering & Applied Science in 1995-2007. Galil was appointed Julian Clarence Levi Professor of Mathematical Methods and Computer Science in 1987, and Morris and Alma A. Schapiro Dean of Engineering in 1995. In 2007 Galil returned to Tel Aviv University and served as president. In 2009 he resigned as president and returned to the faculty as a professor of Computer Science. In July 2010 he became The John P. Imlay, Jr. Dean of Computing at Georgia Tech. In June 2019 he stepped down as dean and became the Frederick G. Storey Chair in Computing and Executive Advisor to Online Programs.

Dr. Galil's research areas have been the design and analysis of algorithms, complexity, cryptography and experimental design. In 1983-1987 he served as chairman of ACM SIGACT, the Special Interest Group of Algorithms and Computation Theory. He has written over 200 scientific papers, edited 5 books, and has given more than 250 lectures in 30 countries. Galil has served as editor in chief of two journals and as the chief computer science adviser in the United States to the Oxford University Press. He is a fellow of the ACM and the American Academy of Arts and Sciences and a member of the National Academy of Engineering. In 2008 Columbia University established the Zvi Galil Award for Improvement in Student Life. In 2009 the Columbia Society of Graduates awarded him the Great Teacher Award. In 2012 the University of Waterloo awarded him an honorary doctorate in mathematics. In 2021 the advisory board of Georgia Tech's College of Computing raised the funds to endow the Zvi Galil PEACE chair; PEACE stands for Pervasive Equitable Access for Computing Education. In 2021 Academic Influence included Dr. Galil on its list of the top influential computer scientists in the last decade.

Abstract of the speech: Georgia Tech's Master of Science in Computer Science is the first MOOC-based highly affordable program, which started in 2014. It now has over 11,000 students and has graduated more than 5,000. Over 70 similar programs followed in its footsteps. The talk will tell

the story of OMSCS, especially what we have learned from our experience. It will be concluded by some thoughts on online learning BC (Before Covid), DC and especially AC.

Plenary Speech 2: Adaptive and Learning Model Predictive Control for Uncertain Dynamic Systems



Speaker: Prof. Dr. Yang Shi

Professor in the Department of Mechanical Engineering, University of Victoria, Victoria, British Columbia, Canada

Fellow of EIC, IEEE, ASM

Co-Editor-in-Chief for *IEEE Transactions on Industrial Electronics*

Short Biography: Yang SHI received the Ph.D. degree in electrical and computer engineering from the University of Alberta, Edmonton, AB, Canada, in 2005. From 2005 to 2009, he was an Assistant Professor and Associate Professor in the Department of Mechanical Engineering, University of Saskatchewan, Saskatoon, Saskatchewan, Canada. In 2009, he joined the University of Victoria, and now he is a Professor in the Department of Mechanical Engineering, University of Victoria, Victoria, British Columbia, Canada. His current research interests include networked and distributed systems, model predictive control (MPC), cyber-physical systems (CPS), robotics and mechatronics, navigation and control of autonomous systems (AUV and UAV), and energy system applications.

Dr. Shi received the University of Saskatchewan Student Union Teaching Excellence Award in 2007. At the University of Victoria, he received the Faculty of Engineering Teaching Excellence in 2012, and the Craighdarroch Silver Medal for Excellence in Research in 2015. He received the JSPS Invitation Fellowship (short-term) in 2013 and the Humboldt Research Fellowship for Experienced Researchers in 2018. His co-authored paper was awarded the 2017 *IEEE Transactions on Fuzzy Systems* Outstanding Paper Award. Currently, he is a member of the IEEE IES Administrative Committee and is the Chair of IEEE IES Technical Committee on Industrial Cyber-Physical Systems. He is Co-Editor-in-Chief for *IEEE Transactions on Industrial Electronics*; he also serves as Associate Editor for *Automatica*, *IEEE Trans. Cybernetics*, etc. He is a Fellow of IEEE, ASME and CSME, and a registered Professional Engineer in British Columbia, Canada. He is a Fellow of Engineering Institute of Canada (EIC).

Abstract of the speech: Model predictive control (MPC) is a promising paradigm for high-performance and cost-effective control of complex dynamic systems. Yet, the MPC schemes and the corresponding optimization problem closely rely on the model of the dynamic system under consideration. In real applications, the mathematical model is hard to be precisely known or even varying. This talk will introduce the development of an adaptive model predictive control (MPC) for a class of constrained linear systems with unknown model parameters. By proactively designing the online estimation mechanism and constructing the tube-based adaptive MPC scheme, the enhanced performance can be achieved compared to the robust tube MPC method. Furthermore, the developed adaptive and learning MPC scheme is applied to the autonomous ground robotics. Finally, some existing challenges and future research directions will be discussed.

Plenary Speech 3: Transitioning into Connected and Autonomous Transportation Infrastructures



Speaker: Prof. Dr. Hossam A. Gabbar

Full Professor, Director of Smart Energy Systems Lab, Ontario Tech University, Canada

Short Biography: Dr. Gabbar is a full Professor in the Ontario Tech University (UOIT) in the Faculty of Energy Systems and Nuclear Science, and cross appointed in the Faculty of Engineering and Applied Science, where he has established both the Smart Energy Systems Lab (SESL), Energy Safety and Control Lab (ESCL), and Advanced Plasma Engineering Lab (APEL). He is the recipient of the Senior Research Excellence Award for 2016, UOIT. He is recognized among the top 2% of worldwide scientists with high citation in the area of smart energy and transportation electrification infrastructures. He has been actively working in the area of transportation electrification autonomous vehicles and their integration with energy and urban infrastructures with safety considerations. He is leading national and international research in the areas of smart energy grids, test platform for connected and autonomous vehicles. Dr. Gabbar obtained his B.Sc. degree in 1988 with first class of honor from the Faculty of Engineering, Alexandria University (Egypt). In 2001, he obtained his Ph.D. degree from Okayama University (Japan). From 2001 till 2004, he joined Tokyo Institute of Technology (Japan), as a research associate. From 2004 till 2008, he joined Okayama University (Japan) as a tenured Associate Professor, in the Division of Industrial Innovation Sciences. From 2007 till 2008, he was a Visiting Professor at the University of Toronto. He has more than 220 publications, including patents, books / chapters, journal and conference papers.

Abstract of the speech: This talk will discuss functional modeling of Connected and Autonomous Vehicles (CAV), and potential integrated testing and verification platform. The talk will explain potential transportation infrastructure and simulation practices for effective CAV deployment using different scenarios. The talk will discuss possible standards, certificates, and Key Performance Indicators (KPIs) for CAV deployment, such as safety, reliability, cost, human interactions, and environmental impacts. The talk will discuss evaluation criteria for different technologies and systems using the integrated CAV test platform. The talk will discuss integrated modeling and simulation framework and co-simulation practices to integrate real time data to support operation and planning scenarios in normal and emergency conditions, including disaster and extreme weather conditions.

Plenary Speech 4: Dynamic Event-Triggered Distributed Coordination Control and Its Applications



Speaker: Prof. Dr. Qing-Long Han

Fellow of IEEE, IEAust

Member of the Academia Europaea (The Academy of Europe)

Pro Vice-Chancellor (Research Quality) and Distinguished Professor
Swinburne University of Technology, Australia

Co-Editor-in-Chief of *IEEE Transactions on Industrial Informatics*

Short Biography: Professor Han is Pro Vice-Chancellor (Research Quality) and a Distinguished Professor at Swinburne University of Technology, Melbourne, Australia. He held various academic and management positions at Griffith University and Central Queensland University, Australia. He received the Ph.D. degree in Control Engineering from East China University of Science and Technology in 1997.

Professor Han has been conducting research in the areas of networked control systems, cyber physical systems, time-delay systems, multi-agent systems, smart grids, offshore structure, unmanned surface vehicles, cyber security, and neural networks. Since 2001, as of 6 September 2021, he has authored or co-authored three hundred and forty-five (345) fully-refereed high quality journal articles including one hundred and seventy-eight (178) articles in the most prestigious IEEE Transactions, and thirty-eight (38) articles in *Automatica*. He has also authored or co-authored one hundred and eighty-four (184) international leading conference papers, five (5) monographs, one (1) research-based book chapter, and edited four (4) conference proceedings and ten (10) special issues. His research work has been cited 33,331 times with an h-index of 102, an i10-index of 298 according to Google Scholar, and 23,951 times with an h-index of 88 according to Clarivate Analytics Web of Science Core Collection.

Professor Han is a Highly Cited Researcher in both Essential Science Indicator (ESI) fields of Engineering and Computer Science (2019-2020), in the ESI Cross-Field (2018) and in the ESI field of Engineering (2014-2017) by Clarivate Analytics (Thomson Reuters). He is one of Australia's Top 5 Lifetime Achievers (Research Superstars) in the discipline area of Engineering and Computer Science by The Australian's Research Magazine (2019-2020). He is one of Australia's Top 5 Researchers in Computer Science and Electronics by Guide2Research.

Professor Han was the recipient of The 2021 M. A. Sargent Medal (the Highest Award of the Electrical College Board of Engineers Australia), The 2020 IEEE Systems, Man, and Cybernetics (SMC) Society Andrew P. Sage Best Transactions Paper Award, The 2020 IEEE Transactions on Industrial Informatics Outstanding Paper Award, and The 2019 IEEE SMC Society Andrew P. Sage Best Transactions Paper Award. He was the recipient of The 2020 IEEE SMC Society Best Associate Editor Award and The 2020 IEEE/CAA Journal of *Automatica Sinica* Outstanding Associate Editor Award.

Professor Han is a Member of the Academia Europaea (The Academy of Europe). He is a Fellow of

The Institute of Electrical and Electronic Engineers (IEEE) and a Fellow of The Institution of Engineers Australia. He has served as an AdCom Member of IEEE Industrial Electronics Society (IES), a Member of IEEE IES Fellow Committee, and Chair of IEEE IES Technical Committee on Network-based Control Systems. He has served as Co-Editor-in-Chief of *IEEE Transactions on Industrial Informatics* (2022-2024), Co-Editor for *Australian Journal of Electrical & Electronics Engineering*, an Associate Editor for 12 international journals including *IEEE Transactions on Cybernetics*, *IEEE Transactions on Industrial Informatics*, *IEEE Industrial Electronics Magazine*, *IEEE/CAA Journal of Automatica Sinica*, *Control Engineering Practice and Information Sciences*, and a Guest Editor for 13 Special Issues.

Abstract of the speech: Distributed coordination control is the current trend in networked systems and finds prosperous applications across a variety of fields, such as smart grids and intelligent transportation systems. One fundamental issue in coordinating and controlling a large group of distributed and networked agents is the influence of intermittent inter-agent interactions caused by constrained communication resources. Event-triggered communication scheduling stands out as a promising enabler to strike a balance between the desired control performance and the satisfactory resource efficiency. What distinguishes dynamic event-triggered scheduling from traditional static event-triggered scheduling is that the triggering mechanism can be dynamically adjusted over time in accordance with both available system information and additional dynamic variables. This keynote talk provides an up-to-date overview of dynamic event-triggered distributed coordination control. The motivation of dynamic event-triggered scheduling is first introduced in the context of distributed coordination control. Then some techniques of dynamic event-triggered distributed coordination control are discussed in detail. Implementation and design issues are well addressed. Furthermore, this keynote talk exemplifies two applications of dynamic event-triggered distributed coordination control in the fields of microgrids and automated vehicles. Several challenges are suggested to direct the future research.

Plenary Speech 5: 2D van der Waals Heterostructures for Emerging Device Applications



Speaker: Prof. Dr. Feng Miao

Full Professor of Physics and a Principal Investigator at Nanjing National Laboratory of Microstructures, Nanjing University, China
National Natural Science Fund of China for Distinguished Young Scholars
Chief Scientist of a National Key Basic Research Program

Short Biography: Feng Miao joined Nanjing University as a full Professor of Physics and a Principal Investigator at Nanjing National Laboratory of Microstructures in July 2012. He received his Ph.D. degree in physics from the University of California, Riverside, United States, in 2009. Then he worked with HP Laboratories, Palo Alto, California, as a research associate for three years. He is a NSFC (National Science Fund of China) Distinguished Young Scholar, and the Chief Scientist of a National Key Basic Research Program. He has published over 100 technical papers (over 20000 citations, H index of 45, Web of Science) and is the inventor of over 30 issued/pending patents. His awards include: Chinese Physical Society “Huang Kun” Award

(2020-2022), IAAM Medal (International Association of Advanced Materials, Sweden) (2021), China "Leading Scientists, Engineers and Innovators" (2019), Clarivate Analytics "Highly Cited Researchers" (2018), China "Young and Middle-aged Leading Scientists, Engineers and Innovators" (awarded by ministry of science and technology, China) (2018), "Jiangsu Youth Stars of Science and Technology" (Jiangsu province government) (2018), Poe Memorial Scholarship Award (University of California, Riverside) (2009), etc. His research is currently focused on electronic transport of two-dimensional materials and their applications for nanoelectronics, including emerging memory, advanced optoelectronics and brain-inspired computing.

Abstract of the speech: Van der Waals (vdW) heterostructures are formed by stacking layers of different 2D materials and offer the possibilities to design new structures with atomic-level precision. In this talk, I will show how these heterostructures provide unprecedented opportunities to realize emerging device applications, especially in the fields of memory, advanced optoelectronics and brain-inspired computing. I will first show that robust memristors with good thermal stability, which is lacking in traditional memristors, can be created from a vdW heterostructure composed of graphene/MoS_{2-x}O_x/graphene. The devices exhibit excellent memory performance with an endurance of up to 10⁷ and a high operating temperature of up to 340 °C. With the help of in situ electron microscopy, we revealed the origin of good thermal stability and a possible switching mechanism.^[1] We also observed ballistic avalanche phenomena in a thin vdW heterostructure made of black phosphorus and Indium Selenide (InSe). Such phenomena can be utilized to realize efficient carrier manipulation and develop advanced optoelectronic devices.^[2] Finally, vdW vertical heterostructures accommodate an abundance of electronic and optoelectronic properties, which could be exploited to realize applications for brain-inspired computing. We demonstrated a prototype reconfigurable neural network vision sensor that operates via the gate-tunable positive and negative photoresponses of a WSe₂/BN heterostructure,^[3] and further realized a neuromorphic vision system with brain-inspired visual perception by networking such retinomorphic sensors with a memristive crossbar array.^[4] Our latest results on an electrically tunable homojunction for reconfigurable circuits, and scalable massively parallel computing scheme using continuous-time data representation will also be presented.^[5-6]

References:

- [1] M. Wang, S. Cai, C. Pan, C. Wang, X. Lian, Y. Zhuo, K. Xu, T. Cao, X. Pan, B. Wang, S. Liang, J. Yang, P. Wang, F. Miao, Nature Electronics 1 (2018) 130.
- [2] A. Gao, J. Lai, Y. Wang, Z. Zhu, J. Zeng, G. Yu, N. Wang, W. Chen, T. Cao, W. Hu, D. Sun, X. Chen, F. Miao, Y. Shi, X. M. Wang, Nature Nanotechnology 14 (2019) 217.
- [3] C. Wang, S. -J Liang, S. Wang, P. Wang, Z. Li, Z. Wang, A. Gao, C. Pan, C. Liu, J. Liu, H. Yang, X. Liu, W. Song, C. Wang, B. Cheng, X. Wang, K. Chen, Z. Wang, K. Watanabe, T. Taniguchi, J. Yang, F. Miao, Science Advances 6 (2020) eaba6173.
- [4] S. Wang, C. Wang, P. Wang, C. Wang, Z. Li, C. Pan, Y. Dai, A. Gao, C. Liu, J. Liu, H. Yang, X. Liu, B. Cheng, K. Chen, Z. Wang, K. Watanabe, T. Taniguchi, S. -J Liang, F. Miao, National Science Review 8 (2021) nwaa172.
- [5] C. Pan, C. Wang, S. -J Liang, Y. Wang, T. Cao, P. Wang, C. Wang, S. Wang, B. Cheng, A. Gao, E. Liu, K. Watanabe, T. Taniguchi, F. Miao, Nature Electronics 3 (2020) 383.

- [6] C. Wang, S. -J. Liang, C. Wang, Z. Yang, Y. Ge, C. Pan, X. Shen, W. Wei, Y. Zhao, Z. Zhang, B. Cheng, C. Zhang, F. Miao, *Nature Nanotechnology* (2021) (online) (DOI: <https://doi.org/10.1038/s41565-021-00943-y>).

Plenary Speech 6: Towards General Optimization Intelligence



Speaker: Prof. Dr. Yew-Soon Ong

President's Chair Professor in Computer Science at Nanyang Technological University (NTU), Singapore

Fellow of IEEE

Founding Editor-in-Chief of the *IEEE Transactions on Emerging Topics in Computational Intelligence*

Short Biography: Yew-Soon Ong (Fellow of IEEE) received the Ph.D. degree in artificial intelligence in complex design from the University of Southampton, U.K., in 2003. He is President's Chair Professor in Computer Science at Nanyang Technological University (NTU), and is the Chief Artificial Intelligence Scientist of the Agency for Science, Technology and Research in Singapore. At NTU, he also serves as Director of the Singtel-NTU Cognitive & Artificial Intelligence Joint Lab, and Director of the Data Science and Artificial Intelligence Research Center. He was Chair of the School of Computer Science and Engineering at NTU from 2016-2018. His research interest is in artificial and computational intelligence, presently in Memetic and Transfer optimization. He is founding Editor-in-Chief of the *IEEE Transactions on Emerging Topics in Computational Intelligence* and AE of IEEE TNNLS, the IEEE Cybernetics, IEEE TEVC, IEEE TAI and others. He has received several IEEE outstanding paper awards, Nanyang Education Excellence Award and was listed as a Thomson Reuters highly cited researcher and among the World's Most Influential Scientific Minds.

Plenary Speech 7: PID Control Meets Networked Systems: The State-Space Approach



Speaker: Prof. Dr. Zidong Wang

Professor of Dynamical Systems and Computing in the Department of Computer Science, Brunel University London, U.K.

Fellow of IEEE

Editor-in-Chief for *International Journal of Systems Science*

Editor-in-Chief for *Neurocomputing*

Editor-in-Chief for *Systems Science & Control Engineering*

Short Biography: Zidong Wang is currently Professor of Dynamical Systems and Computing in the Department of Computer Science, Brunel University London, U.K. From 1990 to 2002, he held teaching and research appointments in universities in China, Germany and the UK. Prof. Wang's research interests include intelligent data analysis, signal processing, bioinformatics, control theory and applications. He has published more than 600 papers in international journals. He is a holder of the Alexander von Humboldt Research Fellowship of Germany, the JSPS Research Fellowship of Japan, William Mong Visiting Research Fellowship of Hong Kong.

Prof. Wang serves (or has served) as the Editor-in-Chief for *International Journal of Systems Science*, the Editor-in-Chief for *Neurocomputing*, the Editor-in-Chief for *Systems Science & Control Engineering*, and an Associate Editor for 12 international journals including *IEEE Transactions on Automatic Control*, *IEEE Transactions on Control Systems Technology*, *IEEE Transactions on Neural Networks*, *IEEE Transactions on Signal Processing*, and *IEEE Transactions on Systems, Man, and Cybernetics-Part C*. He is a Member of the Academia Europaea, a Member of the European Academy of Sciences and Arts, an Academician of the International Academy for Systems and Cybernetic Sciences, a Fellow of the IEEE, a Fellow of the Royal Statistical Society and a member of program committee for many international conferences.

Abstract of the speech: In this presentation, we talk about the PID controller and PI observer design problems for networked stochastic systems. Some background knowledge is first introduced on traditional PID control from the perspectives of concepts, applications and challenges. Then, some detailed discussions are given on the state-space representation of the PID control problem for networked systems under network-induced phenomena, communication protocols or cyber-attacks. Both the stability and performance indices are justified in the framework of PID controller and PI observer design, and a few recent results are presented. Finally, we conclude our main contributions and some future directions.

Plenary Speech 8: Edge Intelligence - Engineering the New Fabric of IoT, Edge, and Cloud



Speaker: Prof. Dr. Shahram Dustdar

Fellow of IEEE

Chair Informatics section of the Academia Europaea

Full Professor, TU Wien, Austria

Head of the Distributed Systems Group (DSG)

Founding co-Editor-in-Chief of *ACM Transactions on Internet of Things*

Editor-in-Chief of *Computing* (Springer)

Short Biography: Shahram Dustdar is Full Professor of Computer Science heading the Research Division of Distributed Systems at the TU Wien, Austria. He has an H-index of 78 with some 36,000 citations. He holds several honorary positions: University of California (USC) Los Angeles; Monash University in Melbourne, Shanghai University, Macquarie University in Sydney, University Pompeu Fabra, Barcelona, Spain. From Dec 2016 until Jan 2017, he was a Visiting Professor at the University of Sevilla, Spain and from January until June 2017 he was a Visiting Professor at UC Berkeley, USA.

From 1999 - 2007 he worked as the co-founder and chief scientist of Caramba Labs Software AG in Vienna (acquired by Engineering NetWorld AG), a venture capital co-funded software company focused on software for collaborative processes in teams. Caramba Labs was nominated for several (international and national) awards: World Technology Award in the category of Software (2001); Top-Startup companies in Austria (Cap Gemini Ernst & Young) (2002); MERCUR Innovation award of the Austrian Chamber of Commerce (2002).

He is founding co-Editor-in-Chief of *ACM Transactions on Internet of Things* (ACM TIoT) as well as Editor-in-Chief of *Computing* (Springer). He is an Associate Editor of *IEEE Transactions on Services Computing*, *IEEE Transactions on Cloud Computing*, *ACM Computing Surveys*, *ACM Transactions on the Web*, and *ACM Transactions on Internet Technology*, as well as on the editorial board of *IEEE Internet Computing* and *IEEE Computer*. Dustdar is recipient of multiple awards: IEEE TCSVC Outstanding Leadership Award (2018), IEEE TCSC Award for Excellence in Scalable Computing (2019), ACM Distinguished Scientist (2009), ACM Distinguished Speaker (2021), IBM Faculty Award (2012). He is an elected member of the Academia Europaea: The Academy of Europe, where he is chairman of the Informatics Section, as well as an IEEE Fellow (2016) and an Asia-Pacific Artificial Intelligence Association (AAIA) Fellow (2021).

Abstract of the speech: As humans, things, software and AI continue to become the entangled fabric of distributed systems, systems engineers and researchers are facing novel challenges. In this talk, we analyze the role of IoT, Edge, Cloud, and Human-based Computing as well as AI in the co-evolution of distributed systems for the new decade. We identify challenges and discuss a roadmap that these new distributed systems have to address. We take a closer look at how a cyber-physical fabric will be complemented by AI operationalization to enable seamless end-to-end distributed systems.

Plenary Speech 9: Towards Solving the Hard Problem of Consciousness: The Varieties of Brain Resonances and the Conscious Experiences That They Support



Speaker: Prof. Dr. Stephen Grossberg

Director, Center for Adaptive Systems

Professor Emeritus of Mathematics & Statistics

Psychological & Brain Sciences, and Biomedical Engineering

Boston University, USA

Fellow of AERA, APA, APS, IEEE, INNS, MDRS, and SEP

Short Biography: Stephen Grossberg is Wang Professor of Cognitive and Neural Systems; Director of the Center for Adaptive Systems; and Professor Emeritus of Mathematics & Statistics, Psychological & Brain Sciences, and Biomedical Engineering at Boston University. He is a principal founder and current research leader in computational neuroscience, theoretical psychology and cognitive science, and neuromorphic technology and AI. In 1957-1958, he introduced the paradigm of using systems of nonlinear differential equations to develop models that link brain mechanisms to mental functions, including widely used equations for short-term memory (STM), or neuronal activation; medium-term memory (MTM), or activity-dependent habituation; and long-term memory (LTM), or neuronal learning. His work focuses upon how individuals, algorithms, or machines adapt autonomously in real-time to unexpected environmental challenges. These discoveries together provide a blueprint for designing autonomous adaptive intelligent algorithms and agents. They includes models of vision and visual cognition; object, scene, and event learning and recognition; audition, speech, and language learning and recognition; development; cognitive information processing; reinforcement learning and cognitive-emotional interactions; consciousness; visual and path integration navigational learning and performance; social cognition and imitation learning; sensory-motor learning, control, and planning; mental disorders; mathematical analysis of neural networks; experimental design and collaborations; and applications to neuromorphic technology and AI. Grossberg founded key infrastructure of the field of neural networks, including the International Neural Network Society (INNS) and the journal Neural Networks, and has served on the editorial boards of 30 journals. His lecture series at MIT Lincoln Lab led to the national DARPA Study of Neural Networks. He is a fellow of AERA, APA, APS, IEEE, INNS, MDRS, and SEP. He has published 17 books or journal special issues, over 550 research articles, and has 7 patents. He was most recently awarded the 2015 Norman Anderson Lifetime Achievement Award of the Society of Experimental Psychologists (SEP), and the 2017 Frank Rosenblatt computational neuroscience award of the Institute for Electrical and Electronics Engineers (IEEE), and the 2019 Donald O. Hebb award of INNS. See the following web pages for further information about his work and his 2021 book: <http://sites.bu.edu/steveg/>

http://en.wikipedia.org/wiki/Stephen_Grossberg

<http://sites.bu.edu/steveg/files/2016/06/GrossbergNNeditorial2010.pdf>

<http://scholar.google.com/citations?user=3BIV70wAAAAJ&hl=en>

<http://www.bu.edu/research/articles/steve-grossberg-psychologist-brain-research/>

<http://www.bu.edu/research/articles/stephen-grossberg-ieee-frank-rosenblatt-award/>

<https://global.oup.com/academic/product/conscious-mind-resonant-brain-9780190070557?cc=us&lang=en&#>

Abstract of the speech: How, where in our brains, and why can we consciously see, hear, feel, and know things about the world, and use these conscious states to control plans and actions that realize valued goals? The Hard Problem of Consciousness is the problem of explaining how this happens. A theory of how the Hard Problem is solved needs to link brain to mind by modeling how brain dynamics give rise to psychological experiences, notably how emergent properties of brain interactions generate properties of individual conscious experiences. This talk summarizes evidence that Adaptive Resonance Theory, or ART, is accomplishing this goal.

ART is the most advanced cognitive and neural theory of how our brains autonomously learn to attend, recognize, and predict objects and events in a changing world. ART has been derived as the unique solution of a thought experiment about how *any* system can autonomously correct errors in a changing world. All of ART's foundational hypotheses have been confirmed by subsequent experiments. ART predicts that "all conscious states are resonant states" and specifies mechanistic links between processes of consciousness, learning, expectation, attention, resonance, and synchrony. It hereby provides functional and mechanistic explanations of data ranging from individual spikes and their synchronization to the dynamics of conscious and unconscious perceptual, cognitive, and cognitive-emotional behaviors. Both normal and clinical psychological and neurobiological data are hereby explained that have not been explained by alternative theories.

Sensory data are ambiguous and incomplete, and thus incapable of supporting effective actions. Only after cortical processing streams that obey *computationally complementary laws* interact within and across multiple parallel processing streams, using a *hierarchical resolution of uncertainty*, do sufficiently complete and stable representations form whereby to control effective actions. Consciousness emerges from resonant states that "light up" such complete representations. Different resonances support conscious support seeing, hearing, feeling, and knowing. The talk also clarifies why some resonances do not become conscious, and why not all brain dynamics are resonant, including brain dynamics that control action.

ART provides a blueprint for large-scale applications in engineering, technology, and AI that embody autonomous adaptive intelligence. To this end, ART has successfully been applied to many large-scale problems in engineering, technology, and AI.

My 2021 book *Conscious MIND, Resonant BRAIN: How Each Brain Makes a Mind* provides a self-contained explanation of all the above concepts and models:

<https://www.amazon.com/Conscious-Mind-Resonant-Brain-Makes/dp/0190070552>

Plenary Speech 10: How DEVS-based Modeling and Simulation Supports Design of Intelligent Cyber-physical Systems



Speaker: Prof. Dr. Bernard P. Zeigler

Professor Emeritus, Department of Electrical and Computer Engineering,
University of Arizona, USA

Chief Scientist, RTSync Corp, Arizona, USA

Fellow of IEEE

International Society for Modeling and Simulation Fellow and Hall of Fame
INFORMS Lifetime Professional Achievement Award

Short Biography: Dr. Bernard P. Zeigler is Professor Emeritus of Electrical and Computer Engineering at the University of Arizona and the Chief Scientist at RTSync Corp (rtsync.com). He received a B.Eng. Physics from McGill, M.S. from MIT, and Ph.D. from the University of Michigan (1968). Prof. Zeigler is best known for his theoretical work concerning modeling and simulation based on systems theory and the Discrete Event Systems Specification (DEVS) formalism which he invented in 1976. His book “Theory of Modeling and Simulation” has become a classic in the field. Recently, he published the third edition of the book as updated with the help of two young researchers and cited by over 7500 researchers. He is considered a Pioneer (<https://d.lib.ncsu.edu/computer-simulation/videos/bernard-p-zeigler-interviewed-by-richard-e-nance-zeigler/>) and a Titan of Simulation (<https://d.lib.ncsu.edu/computer-simulation/lectures/mc00542-bernie-zeigler-titan-talk/>). His R&D work in academia and industry has received recognition from numerous funding and professional agencies. Zeigler is a Fellow of the Institute of Electrical and Electronics Engineers (IEEE) and The Society for Modeling and Simulation International (SCS). He is a member of the SCS Hall of Fame and received the Institute for Operations Research and Management Sciences (INFORMS) Simulation Society Lifetime Professional Achievement Award. His interests include Modeling and Simulation methodology, Intelligent Systems, Knowledge Based System Design and Engineering, Cognitive behavior modeling and simulation, and cyber-physical systems Internet-of-Things realizations. At RTSync, a spinoff company from the Arizona Center for Integrative Modeling and Simulation which he co-founded, he helps to apply modeling and simulation methodology and supporting software to defense and healthcare systems of systems. Also occupying his attention is the development of the Modeling and Simulation Body of Knowledge (<https://scs.org/body-of-knowledge-archive/>). His Wikipedia page is https://en.wikipedia.org/wiki/Bernard_P_Zeigler.

Abstract of the speech: The discipline of Modeling and Simulation (M&S) offers a strong computational foundation, concepts, and tools for the field of computational intelligence. Simulation has proven to be a widely used tool for computational experimentation with a view to developing and improving intelligent system techniques. At the core of the M&S discipline is operational characterization of the elements: real system data, experimental frame, model, and simulator, as well as the relationships that must bind these components together to constitute a meaningful application. Mathematical system theory provides the underlying substrate for expressing this ontology and paves the way to sound conceptualization of complex systems.

In this talk, we show how the two main and orthogonal, pillars of M&S theory – levels of system specification with associated morphisms, and systems specification formalisms – help develop models of complex intelligent systems. We discuss Discrete Event System Specification (DEVS) models that exhibit intelligent behaviors and can be developed, observed and tested in computational form. To do this, we review the basics of the systems theory underlying DEVS as an M&S abstraction. Then we show how DEVS represents individual atomic agents and their hierarchical compositions to realize temporal event behaviors by having the necessary states, processing signals, and memory features while coordinating themselves in space and time. Mathematical system-theory proofs of such models' canonical minimal realizations support the claim that their structures must be embedded in any plausible model of intelligent behavior. Thus, we argue that discrete event models of this nature constitute waypoints in the search for implementations involving basic architectural structure patterns. Implications of this methodology for realizations of intelligent natural (brain), and artificial (autonomous), cyber-physical systems are then discussed.

Plenary Speech 11: Recent Advances on Hand Rehabilitation Robots for Post-Stroke Patients



Speaker: Prof. Dr. Long Cheng
Full Professor, Institute of Automation, Chinese Academy of Sciences, China
National Natural Science Fund of China for Distinguished Young Scholars

Short Biography: Long Cheng received the B.S. (Hons.) degree in control engineering from Nankai University, Tianjin, China, in 2004, and the Ph.D. (Hons.) degree in control theory and control engineering from the Institute of Automation, Chinese Academy of Sciences, Beijing, China, in 2009. He is currently a Full Professor with the Institute of Automation, Chinese Academy of Sciences. He is also an adjunct Professor with University of Chinese Academy of Sciences. He has published over 100 technical papers in peer-refereed journals and prestigious conference proceedings. He was a recipient of the IEEE Transactions on Neural Networks Outstanding Paper Award from IEEE Computational Intelligence Society, the Aharon Katzir Young Investigator Award from International Neural Networks Society and the Young Researcher Award from Asian Pacific Neural Networks Society. He is currently serving as an Associate Editor/Editorial Board Member of *IEEE Transactions on Cybernetics*, *Neural Processing Letters*, *Neurocomputing*, *International Journal of Systems Science*, and *Acta Automatica Sinica*. His current research interests include the rehabilitation robot, intelligent control and neural networks.

Abstract of the speech: Post-stroke patients pay most attention to the upper-/lower-limb rehabilitation and neglect the rehabilitation training of the hand. However, hand is the most important execution organ of human beings, which plays a critical role in daily lives. Meanwhile, the area charging the hand motor in the human's brain is large. Therefore, the study on the hand rehabilitation robot can help the function recovery of patients' hands and improve their brain plasticity, which is valuable theoretically and practically. This talk is going to introduce the

mechanism design and optimization techniques of the motion-compatible hand rehabilitation robot to ensure the comfortable and safe use of the robot. In addition, some novel impedance control algorithms are presented to realize the passive/active rehabilitation training.

Part III Poster Presentations

Presentation Link: <https://www.isaic-conf.com/#/listofposters>

Paper ID	Paper Title & Presenter
ISAIC-MS-2185	Research on the vibration in hot tandem rolling mill <i>Yifang Zhang, Shanghai Polytechnic University, China</i>
ISAIC-MS-2376	Approaches to calculating the individual contribution of mitochondrial mutations to the function of cellular oxygen absorption in human monocytes cell lines <i>Omelchenko Andrey Vladimirovich, Institute for Atherosclerosis Research, Russia</i>
ISAIC-MS-2119	Design of network security protection system for internet of vehicles under electric internet of things background <i>Xueer Wang, State Grid Chongqing Information & Tele communion Company, China</i>
ISAIC-MS-2123	Design and implementation of remote monitoring system for rare trees based on LoRa communication <i>Xiushan Wu, Zhejiang University of Water Resources and Electric Power, China</i>
ISAIC-MS-2354	Research on identification method of fragile component of power grid considering both structure and state <i>Xuetao Yang, China Electric Power Research Institute, China</i>
ISAIC-MS-2044	QoS assessment for voice and video data based on a wireless network testbed <i>Ngo Hai Anh, Institute of Information Technology, Viet Nam Academy of Science and Technology, Viet Nam</i>
ISAIC-MS-2069	Distributed control system for agrotechnical processes using customizable procedural regulations <i>Nikiforov Aleksey Vileninovich, Kharkov National University Air Force, Ukraine</i>
ISAIC-MS-2075	Cognitive digital platforms of scientific education <i>Oleksandr Stryzhak, National Center "Junior Academy of Sciences of Ukraine", Ukraine</i>
ISAIC-MS-2143	Marking and cutting of non-metallic products with CO ₂ laser <i>Nikolay Dolchinkov, Vasil Levski, National Military University, Veliko Tarnovo, Bulgaria / National Research University "Moscow Power Engineering Institute", Moscow, Russia</i>
ISAIC-MS-2150	Development and implementation of a model in Matlab SIMULINK responsible for the analysis of sensor data via the CAN bus <i>Szymon Elert, Military Institute of Armament Technology, Poland</i>
ISAIC-MS-2161	Electromagnetic waves' dynamic simulation in a confined space under limiting conditions <i>Danylo Shovhelia, Oles Honchar Dnipro National University, Ukraine</i>
ISAIC-MS-2169	PharmaLab: a tool to study the drug action on the mouse ventricular myocyte <i>Matheus Leonardo Alves de Camargo, University of Mogi das Cruzes, Brazil</i>

ISAIC-MS-2302	Model of hydrodynamic friction in the boundary layer on an inclined flat surface of an aircraft <i>Konstantin Polyakov, Samara State Technical University, Russia</i>
---------------	--

Part IV Oral Presentations

Online Live Presentation

- Online live presentations will be conducted via [VooV Meeting](#).
- The duration of each invited speech is 25 minutes, including 1-3 minutes of Q&A.
- The duration of each regular oral presentation is 15 minutes, including 1-3 minutes of Q&A.
- All presenters are requested to reach the Online Session Room prior to the schedule time and complete their presentation on time.
- All presentation times are shown in China Standard Time/Beijing Time (GMT +8:00).
- If a presenter cannot show up on time or have problem with internet connect, the session chair has the right to rearrange his/her presentation, and let the next presentation start.

Pre-recorded Video Presentation

- A pre-recorded video file (in .MP4 format) is required and the length of each video is 15-20 minutes. Please make the video record and send it to the Organizing Committee in advance.
- Videos will be played at the end of each session by the Organizing Committee.
- The audience may contact the presenter directly via email for questions and discussions after viewing the video.

Oral Session_1 Artificial Intelligence (I)

Time: **December 4, 2021, Saturday, 19:00--**

VooV Meeting ID: **214 309 960**

Accessing Link: <https://meeting.tencent.com/dm/NymjchTaejPd>

Session Chairs: **Dr. Alain Nogaret, Univeristy of Bath, UK**

Time	Paper ID	Paper Title & Presenter
19:00-19:25	ISAIC-MS-2021 (Invited Talk)	Study of N6-methyladenosine using tensor decomposition-based unsupervised feature extraction <i>Y-h. Taguchi, Chuo University, Japan</i>
19:25-19:50	ISAIC-MS-2236 (Invited Talk)	Clustering evaluation methods: challenges and solutions <i>Jean-Charles LAMIREL, University of Strasbourg, France & University of Dalian, China</i>
19:50-20:15	ISAIC-MS-2410 (Invited Talk)	Neural circuit policies enabling auditable autonomy <i>Radu Grosu, Technische Universität Wien, Austria</i>
20:15-20:30	ISAIC-MS-2112	Estimation of neuron parameters from imperfect observations <i>Alain Nogaret, Univeristy of Bath, UK</i>

20:30-20:45	ISAIC-MS-2279	Traffic signal settings optimization using AI <i>Paweł Gora, University of Warsaw, Poland</i>
20:45-21:00	ISAIC-MS-2118	Pattern inversion as a pattern recognition method for machine learning <i>Alexei Mikhailov, Institute of Control Problems Russian Academy of Sciences, Russia</i>
21:00-21:15	ISAIC-MS-2141	Artificial intelligence as a tool to support students' bachelor's degree and vocational training choices <i>Aitor Moreno Fdz. De Leceta, Ibermática, Spain</i>
21:15-21:25	Short Break	
21:25-21:40	ISAIC-MS-2153	Development of a face identification system's prototype <i>Tkachenko Sergey, Immanuel Kant Baltic Federal University, Russia</i>
21:40-21:55	ISAIC-MS-2162	Temperature-based collision detection in extreme low light condition with bio-inspired LGMD neural network <i>Yicheng Zhang, University of Lincoln, UK</i>
21:55-22:10	ISAIC-MS-2170	Powerful Ad-Hoc probabilistic metric for improving spellchecking typing text– General cases: Space and editing errors <i>Hicham Gueddah, Mohammed V University in Rabat, Morocco</i>
22:10-22:25	ISAIC-MS-2386	Defect detection in the textile industry using image-based machine learning methods: a brief review <i>Somayeh Shahrabadi, Center for Computer Graphics (CCG), Portugal</i>
22:25-22:40	ISAIC-MS-2385	Using deep learning to detect the presence/absence of defects on leather: On the way to build an industry-driven approach <i>Somayeh Shahrabadi, Center for Computer Graphics (CCG), Portugal</i>
22:40-22:55	ISAIC-MS-2195	On the application of SISO LSTM networks to forecast financial quarterly reports <i>Adam Galuszka, Silesian University of Technology, Poland</i>
22:55-23:10	ISAIC-MS-2396	Application of machine learning approaches in health care sector to the diagnosis of breast cancer <i>Wassim Ahrou, Mohammed V University, Rabat Agdal, Morocco</i>

Oral Session_2 System Modelling and Analysis (I)

Time: **December 4, 2021, Saturday, 19:00--**

VooV Meeting ID: **574 460 370**

Accessing Link: <https://meeting.tencent.com/dm/yU0DLwvPNY3b>

Session Chairs: **Dr. Giuseppe Di Fazio, University of Catania, Italy**

Dr. Pericle Perazzo, University of Pisa, Italy

Time	Paper ID	Paper Title & Presenter
19:00-19:25	ISAIC-MS-2165 (Invited Talk)	Gradient estimates for weak solutions of Elliptic PDE's <i>Giuseppe Di Fazio, University of Catania, Italy</i>
19:25-19:40	ISAIC-MS-2157	Integration satellite imagery with fuzzy logic for potential change detection in land use/land cover <i>Al-Juboury I. A. M., Uneversity of Babylon, Iraq</i>

19:40-20:05	ISAIC-MS-2198 (Invited Talk)	Assessing the cost of quantum security and attribute-based security for automotive over-the-air updates <i>Pericle Perazzo, University of Pisa, Italy</i>
20:05-20:20	ISAIC-MS-2202	Design of impeller blades in the intermediate stage of centrifugal pump to a preset shape of meridional flow pattern <i>O O Bondariev, JSC "VNIIAEN", Ukraine</i>
20:20-20:35	ISAIC-MS-2224	Modelling taxi drivers' behaviour for the next destination prediction <i>Alberto Rossi, University of Florence, Italy</i>
20:35-20:50	ISAIC-MS-2263	Building a creative school <i>Jenny Siung, Chester Beatty, Ireland</i>
20:50-21:00	Short Break	
21:00-21:15	ISAIC-MS-2316	Strolling potential energy surfaces: An application of the Island Model to molecular modeling <i>Giordano Mancini, Scuola Normale Superiore, Italy</i>
21:15-21:30	ISAIC-MS-2358	Motion of mass source in stratified fluid <i>Dmitri Knyazkov, Ishlinsky Institute for Problems in Mechanics RAS, Russia</i>
21:30-21:45	ISAIC-MS-2349	Analysis of the COVID-19 communication on Twitter via multilayer network <i>Milan Petrović, University of Rijeka, Croatia</i>
21:45-22:00	ISAIC-MS-2395	Effects of manufacturing-induced operating-conditions amplified stresses on fatigue-life prediction of micro gas turbine blades – A Simulation-based study <i>Festus Oluwadare Fameso, Tshwane University of Technology, South Africa</i>
22:00-22:15	ISAIC-MS-2339 (Video)	A model for clinical engineering staffing and budget <i>Binseng Wang, Sodexo Healthcare Technology Management, USA</i>
22:15-22:30	ISAIC-MS-2221 (Video)	Fluorite-like neodymium molybdates doped with lead <i>Lyudmyla Stackpool (Ardanova), Minnesota State University, Mankato, USA</i>
22:30-22:45	ISAIC-MS-2248 (Video)	A validated dynamical thermal model of a kW-class Vanadium Redox Flow Battery <i>Andrea Trovò, University of Padua, Italy</i>
22:45-23:00	ISAIC-MS-2272 (Video)	Study on logistics warehouse dynamic fire risk assessment based on Gustav method <i>Wenhui Ju, Tsinghua University, China</i>

Oral Session_3 Artificial Intelligence (II)

Time: **December 5, 2021, Sunday, 09:00--**

VooV Meeting ID: **577 562 400**

Accessing Link: <https://meeting.tencent.com/dm/SLVTRbhWekpi>

Session Chair: **Dr. Chuck Easttom, Georgetown University, USA**

Time	Paper ID	Paper Title & Presenter
09:00-09:15	ISAIC-MS-2166	Fuzzy logic and its impact on machine learning and AI <i>Chuck Easttom, Georgetown University, USA</i>

09:15-09:30	ISAIC-MS-2176	Machine learning and bigdata for security incident response <i>Gustavo Navas, UPS, Ecuador</i>
09:30-09:45	ISAIC-MS-2281	A new few-shot learning method of dPCR image detection <i>Beini Zhang, Hongkong University of Science and Technology, Hongkong, China</i>
09:45-10:00	ISAIC-MS-2136	Class specific dictionary learning with the independence between-class and dependence intra-class coefficient's constraint <i>Yu Du, Lanzhou University, China</i>
10:00-10:15	ISAIC-MS-2265	Learning reaching tasks using an arm robot equipped with MACMSA <i>Motohiro Akikawa, Tokyo Institute of Technology, Japan</i>
10:15-10:30	ISAIC-MS-2362	Categorical learning-based key steps prediction in the draft process of MOBA games <i>Runlu Zhu, Tongji University, China</i>
10:30-10:45	ISAIC-MS-2387	Offloading decision making for workflow applications using an enhanced Genetic algorithm in the Edge environment <i>S. Balasubramanian, Alagappa University, India</i>
10:45-10:55	Short Break	
10:55-11:10	ISAIC-MS-2299 (Video)	Brain dynamics for the control of the steady motor output <i>Pierpaolo Croce, University of Study "G.d'Annunzio", Italy</i>
11:10-11:25	ISAIC-MS-2158 (Video)	Study on a compatible model combining point cloud model and digital elevation model <i>Wenbo Guo, Northwest Normal University, China</i>
11:25-11:40	ISAIC MS 2072 (Video)	A comparative study on part-of-speech taggers' performance on examination questions classification according to bloom's taxonomy <i>Goh Thing Thing, UOWM KDU UC, Malaysia</i>
11:40-11:55	ISAIC-MS-2174 (Video)	Early estimation of daily reference evapotranspiration using machine learning techniques for efficient management of irrigation water <i>EL HACHIMI Chouaib, Mohammed VI Polytechnic University (UM6P), Morocco</i>
11:55-12:10	ISAIC-MS-2269 (Video)	Ontology and query system implementation of a Computer Science Program using Grüninger and Fox's methodology <i>Mireya Tovar Vidal, Benemerita Universidad Autonoma de Puebla, Mexico</i>
12:10-12:25	ISAIC-MS-2334 (Video)	Analyzing performance of text classifier of multi-class algorithm between naïve bayes and linear support vector machine <i>Nur Suhailayani Suhaimi, Universiti Kebangsaan Malaysia, Malaysia</i>
12:25-12:40	ISAIC-MS-2375 (Video)	Management of historical users data in context-aware multimedia documents adaptation processes <i>Aziz Smaala, University of Oum El-Bouaghi, Algeria</i>
12:40-12:55	ISAIC-MS-2379 (Video)	Neurostimulator and qEEG for the metacognitive resilience of infants by COVID-19 <i>Griselda Cortés Barrera, Tecnológico De Estudios Superiores De Ecatepec, Mexico</i>

12:55-13:10	ISAIC-MS-2378 (Video)	Dashboards OnDemand <i>Avi Seth, Virginia Tech, USA</i>
13:10-13:25	ISAIC-MS-2242 (Video)	Alice in GAN Land <i>Vishnu S. Pendyala, San Jose State University, USA</i>
13:25-13:40	ISAIC-MS-2340 (Video)	AI-assistant prediction of body constitution: from inquiry to recovery <i>Guang Shi, Nara Institute of Science and Technology, Japan</i>
13:40-13:55	ISAIC-MS-2228 (Video)	Application of algorithm of fuzzy rule conclusions in determination of animal's diseases <i>Holida Primova, Samarkand Branch of Tashkent University of Information Technologies, Uzbekistan</i>

Oral Session_4 System Modelling and Analysis (II)

Time: **December 5, 2021, Sunday, 09:00--**

VooV Meeting ID: **664 197 898**

Accessing Link: <https://meeting.tencent.com/dm/P8M3srmFGkbq>

Session Chair: **Dr. Xinmin Zhang, Zhejiang University, China**

Time	Paper ID	Paper Title & Presenter
09:00-09:25	ISAIC-MS-2121 (Invited Talk)	Industrial data modeling and analysis with application to process industries <i>Xinmin Zhang, Zhejiang University, China</i>
09:25-09:40	ISAIC-MS-2230	Physics concept space: An application of Fischer's thought space <i>Nageswar Rao Chekuri, Woodbury University, USA</i>
09:40-09:55	ISAIC-MS-2270	Enhancement of active swimming near fluid interfaces <i>Jian Du, Florida Institute of Technology, USA</i>
09:55-10:10	ISAIC-MS-2342	Testing long memory with parametric bootstrap <i>Yixun Xing, University of North Texas, USA</i>
10:10-10:25	ISAIC-MS-2289	Reaction model and heat release for low-temperature ignition of isobutanol <i>Juan Carlos Prince, Tecnologico de Monterrey, Mexico</i>
10:25-10:40	ISAIC-MS-2398	Stimulation and acquisition system to obtain the visual evoked potential related to the optic nerve pathologies <i>Jesus Alejandro Montalvo Aguilar, Universidad Autonoma de Aguascalientes, Mexico</i>
10:40-10:55	ISAIC-MS-2384	Modeling of aggregates using aperiodic space-filling and physical simulation <i>Xiaobo Gan, Tokyo University of Technology, Japan</i>
10:55-11:10	ISAIC-MS-2126	Knowledge management process status via the use of current technology <i>Nithinant Thammakoranonta, National Institute of Development Administration, Thailand</i>

11:10-11:25	ISAIC-MS-2389	Iterative method of finding all thermophysical parameters of a two-layer soil <i>Mukhametkaliyeva Nazerke, International Information Technology University, Kazakhstan</i>
11:25-11:35	Short Break	
11:35-11:50	ISAIC-MS-2149 (Video)	Holographic study of unstable surface deformations by the method of combined exposure of interferograms <i>Yu M Selivanov, Oles Gonchar Dnipro National University, Ukraine</i>
11:50-12:05	ISAIC-MS-2256 (Video)	Dynamic Business Modeling for Sustainability: Exploring a system dynamics perspective to Integrate Social Lifecycle Sustainability Assessment <i>Jing Lin, Université Paris 1 Panthéon-Sorbonne, France & Siemens Digital Industries Software, Munich Germany</i>
12:05-12:20	ISAIC-MS-2303 (Video)	Relationship of student participation and punctuality in their performance in e-learning sessions in the current COVID-19 context <i>Ernesto Hernández Martínez, Universidad Nacional de Frontera, Peru</i>
12:20-12:35	ISAIC-MS-2377 (Video)	Reallocation of Auto Parts in the Warehouse of an Automotive Company <i>Martha Mitzi Cortes Hernandez, UPAEP University, Mexico</i>
12:35-12:50	ISAIC-MS-2172 (Video)	Data Collector design for Vibration Analysis by Raspberry pi 3B embedded system means for Industrial Applications <i>Carlos Gerardo Cardenas Arias, Unidades Tecnologicas de Santander, Colombia</i>
12:50-13:05	ISAIC-MS-2226 (Video)	Performance Evaluation of a Parabolic Trough Collector Applying SolTrace and TRNSYS <i>Brayan Eduardo Tarazona, Unidades Tecnologicas de Santander, Colombia</i>
13:05-13:20	ISAIC-MS-2209 (Video)	Performance Evaluation of a Linear Fresnel Concentrator Applying Numerical Simulation <i>Brayan Eduardo Tarazona, Unidades Tecnologicas de Santander, Colombia</i>

Oral Session_5 Network Science and Engineering

Time: December 5, 2021, Sunday, 19:00--

VooV Meeting ID: **897 836 081**

Accessing Link: <https://meeting.tencent.com/dm/WgFpRfbUankC>

Session Chair: **Dr. Songmei Yu, Felician University, USA**

Time	Paper ID	Paper Title & Presenter
------	----------	-------------------------

19:00-19:25	ISAIC-MS-2155 (Invited Talk)	Measure group and individual social influence in social media <i>Songmei Yu, Felician University, USA</i>
19:25-19:50	ISAIC-MS-2183 (Invited Talk)	Analytical model for classifying areas of interest in interactive systems <i>Marcos César da Rocha Seruffo, Federal University of Para, Brazil</i>
19:50-20:05	ISAIC-MS-2245	Modulation of brain functional connectivity and efficiency during an endurance cycling task: A source-level EEG and graph theory approach <i>Gabriella Tamburro, University of Study "G.d'Annunzio", Italy</i>
20:05-20:20	ISAIC-MS-2032	Blind write protocol throughput <i>Khairul Anshar, Universiti Teknikal Malaysia, Malaysia</i>
20:20-20:35	ISAIC-MS-2273	Over-the-air programming system for IoT devices with a Non-native wireless update service <i>José Manuel Lozano Domínguez, University of Huelva, Spain</i>
20:35-20:50	ISAIC-MS-2392	Detect Denial of Service attack (DoS) in MANETs partition scenario using puzzle map method <i>Albandari Alsumayt, Imam Abdulrahman bin Faisal University, Saudi Arabia</i>
20:50-21:00	Short Break	
21:00-21:15	ISAIC-MS-2050 (Video)	An approach of IoT enabled by TCNet: Trellis Code Network – a new algorithm and routing protocol <i>Diogo F. Lima Filho, Paulista University – UNIP, Brazil</i>
21:15-21:30	ISAIC-MS-2110 (Video)	Communications and networks: perceptions of Covid-19 various groups of Russian speaking actors <i>Maria Pilgun, Institute of Linguistics, Russian Academy of Sciences, Russia</i>
21:30-21:45	ISAIC-MS-2178 (Video)	The influence of the effect of marketing incentives on the dynamics of the development of classic and cryptocurrency payment systems <i>Pavel Pimenov, Saint-Petersburg State University, Russia</i>
21:45-22:00	ISAIC-MS-2315 (Video)	Security assessment of the MQTT-SN protocol for the internet of things <i>José Roldán-Gómez, Universidad de Castilla-La Mancha, Spain</i>
22:00-22:15	ISAIC-MS-2350 (Video)	Hajime's Return: Stories from a customized Honeypot for IoT <i>Javier Carrillo Mondéjar, Universidad de Castilla-La Mancha, Spain</i>
22:15-22:30	ISAIC-MS-2393 (Video)	Forensic analysis of the IoT operating system ubuntu core <i>Juan Manuel Castelo Gómez, Universidad de Castilla-La Mancha, Spain</i>
22:30-22:45	ISAIC-MS-2154 (Video)	Dark energy as the information field of the universe and man <i>Alexander Bogomolov, Financial University under the Government of the Russian Federation, Russia</i>

Oral Session_6 Intelligent Control

Time: December 5, 2021, Sunday, 19:00--

VooV Meeting ID: [493 362 663](#)

Accessing Link: <https://meeting.tencent.com/dm/4rJVjXG7o5OT>

Session Chair: **Dr. Hassan Haes Alhelou, University College Dublin (UCD), Ireland**

Time	Paper ID	Paper Title & Presenter
19:00-19:25	ISAIC-MS-2262 (Invited Talk)	Stability and cybersecurity of power systems with high renewable energy shares from frequency control perspective <i>Hassan Haes Alhelou, University College Dublin (UCD), Ireland</i>
19:25-19:40	ISAIC-MS-2254	Modeling and control of one-stage inverted pendulum body based on Matlab <i>Xueyan Lin, Beijing University of Posts and Telecommunications, China</i>
19:40-19:55	ISAIC-MS-2278	Backstepping adaptive trajectory tracking control of manipulator with uncertainties of model and state <i>Yuhang Liu, Xi'an Polytechnic University, China</i>
19:55-20:10	ISAIC-MS-2182	Stable reverse driving of a tractor with multiple trailers <i>Blaž Jelenc, University of Ljubljana, Slovenia</i>
20:10-20:25	ISAIC-MS-2338	Features of the formation of an "information flight model" by simulators of an aviation simulator <i>Vladimir Roganov, Penza State Technological University, Russia</i>
20:25-20:40	ISAIC-MS-2399	Theory and practice of creating a two energy outputs magnetron <i>Gennadiy Churyumov, O.Ya. Usikov Institute for Radiophysics and Electronics of National Academy of Science of Ukraine, Kharkiv, Ukraine</i>
20:40-20:50	Short Break	
20:50-21:05	ISAIC-MS-2152 (Video)	Internet of things models for flexible manufacturing systems <i>Calin Ciufudean, "Stefan cel Mare" University of Suceava, Romania</i>
21:05-21:20	ISAIC-MS-2359 (Video)	Computation of Lyapunov functions for stochastic differential equations <i>Sigurdur Freyr Hafstein, University of Iceland, Iceland</i>
21:20-21:35	ISAIC-MS-2041 (Video)	Signaling pathways in foam cell formation <i>Vasily Sukhorukov, Russian Medical Research Center of Cardiology, Institute of Experimental Cardiology, Laboratory of Medical Genetics, Russia</i>
21:35-21:50	ISAIC-MS-2100 (Video)	An identification comparison of chaotic systems using recurrent neural networks <i>J. Jesus Serrano-Perez, Universidad Iberoamericana, Mexico</i>
21:50-22:05	ISAIC-MS-2287 (Video)	Development of two control strategies for tracking the trajectory of an unmanned underwater structure inspection vehicle <i>Sebastián Roa Prada, Universidad Autónoma de Bucaramanga, Colombia</i>
22:05-22:20	ISAIC-MS-2164 (Video)	Model to relationship the speed of hand movements with the SEMG signals from the forearm <i>Camilo Leonardo Sandoval Rodriguez, Universidad Autónoma de Bucaramanga, Colombia</i>
22:20-22:35	ISAIC-MS-2175 (Video)	Control techniques applied to two degrees of freedom planar robotic arm <i>Jessica Gissella Maradey Lazaro, Universidad Autónoma de Bucaramanga, Colombia</i>

22:35-22:50	ISAIC-MS-2177 (Video)	Design of an Automatic Palletizer <i>Jessica Gissella Maradey Lazaro, Universidad Autónoma de Bucaramanga, Colombia</i>
22:50-23:05	ISAIC-MS-2335 (Video)	Adaptive cruise control of virtual coupled trains based on sliding mode <i>Di Wang, Beijing Jiaotong University, China</i>

Oral Session_7 System Optimization and Application (I)

Time: **December 6, 2021, Sunday, 09:00--**

VooV Meeting ID: **336 344 067**

Accessing Link: <https://meeting.tencent.com/dm/jggzemo1ioLn>

Session Chair: **Dr Haoran Ji, Tianjin University, China**

Time	Paper ID	Paper Title & Presenter
09:00-09:25	ISAIC-MS-2243 (Invited Talk)	Data-driven optimal operation of flexible distribution networks <i>Haoran Ji, Tianjin University, China</i>
09:25-09:50	ISAIC-MS-2188 (Invited Talk)	A comparative study of Interactive Learning vs. Adaptive Learning in online programming classes <i>Richard Cai, Colorado Technical University, USA</i>
09:50-10:05	ISAIC-MS-2071	Domain-aware Gaussian processes and high-performance mathematical optimization for optimal and autonomous data acquisition <i>Marcus Michael Noack, Lawrence Berkeley National Laboratory, USA</i>
10:05-10:20	ISAIC-MS-2312	Secrecy capacity of cost-constrained wiretap channels <i>Sreejith Sreekumar, Cornell University, USA</i>
10:20-10:35	ISAIC-MS-2077	Research into the impact of cloud service provider's capability configuration on cloud service performance based on multi-agent simulation method <i>Xin Zheng, University of Science and Technology Beijing, China</i>
10:35-10:50	ISAIC-MS-2026	Polynomial Wiener LQG controllers based on Toeplitz matrices <i>T.J. Moir, Auckland University of Technology, New Zealand</i>
10:50-11:00	Short Break	
11:00-11:15	ISAIC-MS-2181 (Video)	Distributed submodular set function maximization subject to matroid constraint over connected graphs <i>Solmaz Kia, University of California Irvine, USA</i>
11:15-11:30	ISAIC-MS-2276 (Video)	Multiscale syntheses of anterior cruciate ligament stresses: from molecular dynamic to continuum mechanics <i>Fadi Alkhatib, Australian College of Kuwait, Kuwait</i>
11:30-11:45	ISAIC-MS-2231 (Video)	Decision-making support software tools based on original authoring Bayesian probabilistic models <i>Dmitry P. Burakov, Emperor Alexander I St. Petersburg State Transport University, Russia</i>
11:45-12:00	ISAIC-MS-2239 (Video)	A comparative study: The benefits of a novel illuminance calculation method over luminance calculation method for optimal roadway lighting design applications <i>Uthayan Thurairajah, WSP Canada, Canada</i>

12:00-12:15	ISAIC-MS-2364 (Video)	Research on quantitative investment strategy of stock index based on XGBoost model <i>Hongxin Zhu, Shenzhen University, China</i>
12:15-12:30	ISAIC-MS-2413 (Video)	Implementation of multiple feature selection algorithms for efficient spoofing detection <i>Syed Faham Ali Zaidi, Donghua University, China</i>

Oral Session_8 System Optimization and Application (II)

Time: **December 6, 2021, Sunday, 19:00--**

VooV Meeting ID: **967 789 317**

Accessing Link: <https://meeting.tencent.com/dm/QpzIGSJ4uHCY>

Session Chair: **Dr. Yulin Zhou, Zhejiang University, Ningbo, China**

19:00-19:25	ISAIC-MS-2040 (Invited Talk)	An index-tracking portfolio with minimum assets <i>Giuseppe Orlando, University of Bari, Italy</i>
19:25-19:40	ISAIC-MS-2277	A rail Wear detection method based on particle swarm algorithm <i>Zhiyuan Chen, Tianjin University, China</i>
19:40-20:05	ISAIC-MS-2059 (Invited Talk)	Boosting spatial division multiplexing with optical transformations <i>Gianluca Ruffato, University of Padova, Italy</i>
20:05-20:20	ISAIC-MS-2296	The impact of disruptive technologies on European banking under different volatility regimes <i>Laura Arenas, Universidad de Barcelona, Spain</i>
20:20-20:35	ISAIC-MS-2061	Modelling a swarm of delivery drones for disaster relief utilizing an organization approach <i>Kolesnikov Valeriy, Sumy State University, Ukraine</i>
20:35-20:50	ISAIC-MS-2353	Digitalization as a motor of agglomerations' development <i>Revekka Vulfovich, North-West Institute for Management of RANEP, Russia</i>
20:50-21:05	ISAIC-MS-2402	Hybrid SWIPT/ambient energy harvesting structures in AF relaying <i>Yulin Zhou, Zhejiang University, Ningbo, China</i>

Oral Session_9 Smart Assistive Technology: A Special Session

Time: **December 6, 2021, Sunday, 19:00--**

VooV Meeting ID: **251 709 735**

Accessing Link: <https://meeting.tencent.com/dm/QpzIGSJ4uHCY>

19:00-19:15	ISAIC-MS-2325	An assistance system for collision avoidance using context - sensitive prediction <i>D Sanders, University of Portsmouth, UK</i>
-------------	---------------	---

19:15-19:30	ISAIC-MS-2323	Human machine interaction using zero force sensing switches incorporating self-adaptation <i>M Haddad, University of Portsmouth, UK</i>
19:30-19:45	ISAIC-MS-2324	Model-based prediction for navigation assistance using a set of sensors <i>D Sanders, University of Portsmouth, UK</i>
19:45-20:00	ISAIC-MS-2319	A novel collision avoidance system for powered wheelchair steering using deep learning architecture <i>M Haddad, University of Portsmouth, UK</i>
20:00-20:15	ISAIC-MS-2326	Voter based control for situation awareness and obstacle avoidance <i>D Sanders, University of Portsmouth, UK</i>
20:15-20:30	ISAIC-MS-2320	Computer-vision algorithms to steer powered wheelchairs <i>M Haddad, University of Portsmouth, UK</i>
20:30-20:45	ISAIC-MS-2322	Model reference control for a powered wheelchair <i>D Sanders, University of Portsmouth, UK</i>
20:45-21:00	ISAIC-MS-2321	Perception of semi-autonomous intelligent vehicles such as smart powered wheelchairs <i>M Haddad, University of Portsmouth, UK</i>